CASE REPORT

Weber B fibula fracture repair using IlluminOss®

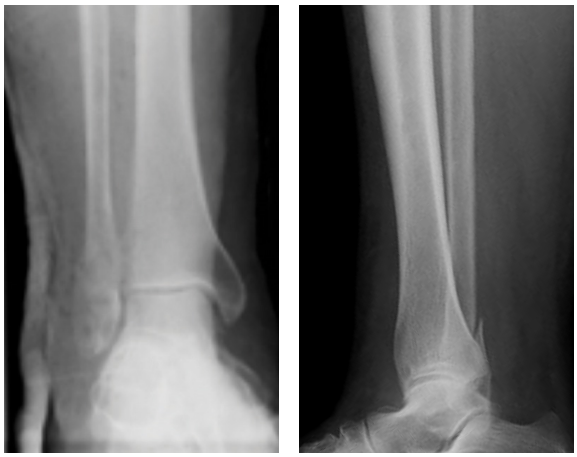
IlluminOss®: a new, patient-conforming, intramedullary implant for treatment of osteoporotic fractures

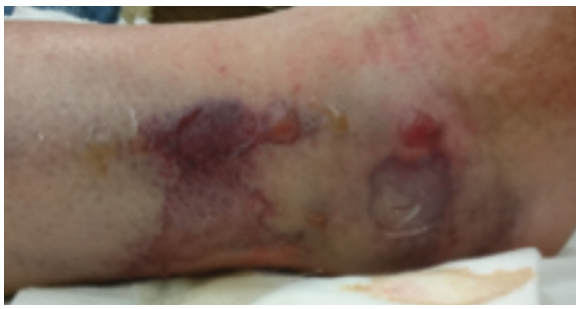
S. Gick, S. Heck, D. Pennig
St. Vinzenz-Hospital Cologne, Clinic for Trauma & Reconstructive Surgery, Hand Surgery, Orthopaedics, Merheimer Strasse 221-223, 50733 Cologne, Germany

Patient History and Diagnosis

A case study is presented on a 72-year-old female who fell while navigating a street curb with a rolling walker. She was seen in the emergency room with a primary diagnosis of a dislocated Weber B fracture AO type 44.B.2 with pronounced soft tissue abrasions, massive soft tissue swelling, and generalized edema.

Preoperative Weber B fracture





Soft tissue damage and swelling of the ankle resulting from the fall

Previous to her fall, the patient suffered from four days of diarrhea, causing generalized physical weakness that contributed to her fall. Ancillary findings showed the patient had apoplexy, diabetes mellitus, obesity, and hypertension, all requiring daily administration of medications.

Initial attempts at resolving the soft tissue injuries included a combination of elevating the leg, cooling, and the use of an AV pump systems. However, these efforts did not result in a sufficient consolidation of the soft tissue. IlluminOss was chosen as a minimally invasive intramedullary approach to stabilize the fracture.

Treatment

The operation to stabilize the fracture was carried out one week after the accident. After general anesthesia was administered, a closed reduction of the fracture was performed under fluoroscopic control through the use of intra-operative Weber tongs.

A minimally invasive incision of approximately 7 mm was made at the tip of the lateral malleolus, and a sharp awl was used to gain access to the medullary canal.

A small bundle nail (k wire) was introduced into the medullary canal, allowing guidewire advancement. Further opening of the canal was achieved with sequentially larger intramedullary burrs. After the canal was cleared to the desired size, an IlluminOss balloon catheter was delivered via a Seldinger technique and filled with the liquid monomer using a standard syringe.

The infusion of the liquid monomer into the balloon caused it to expand and conform to the shape of the medullary canal. The position of the balloon catheter was determined using intraoperative fluoroscopic guidance, and the implant was cured with the application of 436 nm visible blue light, creating the implant in-situ and maintaining the reduction.

At the conclusion of the curing cycle, the reduction clamp was removed and the stability of the fracture was confirmed under fluoroscopy. The result was a high degree of primary stability in both pronation and supination.

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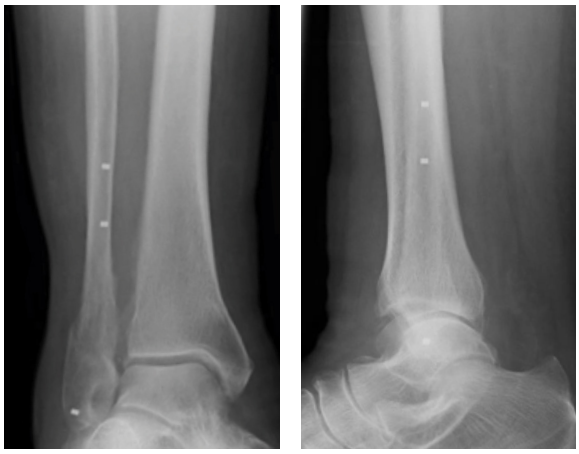
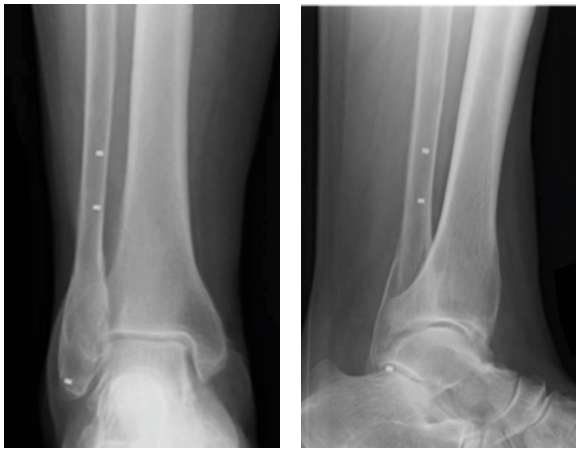
Postoperative X-rays at one week



Postoperative X-rays at 5 years



In 2016, more than four years after her initial surgery, the patient presented in our clinic for issues not related to the fibula. During this stay, we took the opportunity to take images of the ankle and fibula treated with the IlluminOss implant. The clinical examination showed that the previous soft tissue injuries were all resolved and the scar on the outer ankle was almost unrecognizable.

Discussion

Osteoporotic fractures, including fibula fractures, are increasingly common and present multiple challenges for the treating physicians. In many cases, patients suffering from these types of fractures have comorbidities, poor bone, and skin quality that complicates hardware purchase in the bone and increases the likelihood of poor wound healing.[1] The complication rate for these patients can approach 30%.[2] A minimally invasive approach offers the potential of decreasing procedure-related complications while retaining the clinical and functional outcomes of traditional procedures. In 2016, Chiang et al found that minimally invasive surgery (MIS) for fibular plating had similar radiographic and functional outcomes to open reduction and internal fixation (ORIF) with less postoperative pain in the near term and fewer wound complications.[3] MIS was also offered as a superior early stabilization method by Singh et al, who found that patients undergoing surgical stabilization of closed ankle fractures within 24 hours of injury had shorter hospital stays.[4]

Outcome/Post-procedure notes

Standard therapy after ORIF of the fibula typically includes the introduction of a 15 kg partial load that is increased weekly for six weeks. Due to the physical limitations of this patient, including obesity, the standard weight bearing protocol was not possible. However, after only 10 days postoperative, the patient was fully weight bearing.

Images from the immediate postoperative period and one week out show the intramedullary position of IlluminOss balloon based upon the radiopaque markers in the anterior-posterior and lateral projections.

Conclusion

This case illustrates successful management of an osteoporotic fracture using IlluminOss' minimally invasive intramedullary implant. From these results, we can conclude that this minimally invasive repair and stabilization of the fibula was successful and avoided the postoperative soft tissue complications common to this type of injury. Additionally, IlluminOss provided immediate stability and load-bearing capability, enabling the patient to follow standard postoperative protocols and shorten the duration of hospitalization.

IlluminOss Medical, Inc.

993 Waterman Avenue
East Providence, Rhode Island 02914 USA
Tel: +1 (401) 714 0008
Fax: +1 (401) 714 0009
info@illuminoss.com

illuminoss.com

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[1] McKean J, Cuellar DO, Hak D, Mauffrey C. Osteoporotic ankle fractures: an approach to operative management. Orthopedics. 2013 Dec;36(12):936-40.

[2] Jain S, Haughton BA, Brew C. Intramedullary fixation of distal fibular fractures: a systematic review of clinical and functional outcomes. J Orthop Traumatol. 2014 Dec;15(4):245-54.

[3] Chiang CC, Tzeng YH, Lin CC, Huang CK, Chang MC. Minimally Invasive Versus Open Distal Fibular Plating for AO/OTA 44-B Ankle Fractures. Foot Ankle Int. 2016 Jan 5.

[4] Singh RA, Trickett R, Hodgson P. Early versus late surgery for closed ankle fractures. J Orthop Surg (Hong Kong). 2015 Dec;23(3):341-4.

This product has the CE mark and is available for sale in the EU.
This product is investigational and not for sale in the United States.